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**WARNING: PRODUCT COMPONENTS PRESENT HEALTH AND SAFETY HAZARDS. READ AND UNDERSTAND THIS MATERIAL SAFETY DATA SHEET (M.S.DS.). ALSO, FOLLOW YOUR EMPLOYER'S SAFETY PRACTICES.**

The information contained herein relates only to the specific product. If the product is combined with other materials, all component properties must be considered. **BE SURE TO CONSULT THE LATEST VERSION OF THE MSDS. MATERIAL SAFETY DATA SHEETS ARE AVAILABLE FROM HARRIS PRODUCTS GROUP** Harris Products Group, HGE PTY LTD, Brisbane | Melbourne | Perth | New Zealand, 14 Queensland Rd, Darra, QLD 4076, Phone: (07) 3375 3670 | Fax: (07) 3375 3620, Email: sales@hgea.com.au, www.harrisproductsgroup.com.au,

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**PART I** *What is the material and what do I need to know in an emergency?*

**1. PRODUCT IDENTIFICATION**

**TRADE NAME (AS LABELED):**

**HIGH SILVER BRAZING ALLOYS**

**CHEMICAL NAME/CLASS:**

**(Bare & Flux-Coated Wire or Rods) Metal Alloy**

**SYNONYMS:**

Not Applicable

**PRODUCT USE:**

Metal Brazing

**DOCUMENT NUMBER:**

0127

**SUPPLIER/MANUFACTURER'S NAME:** HARRIS Products Group

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**DATE OF PREPARATION:**

July 30, 2010

**Effective Date:** 1/1/2016

**2. NOMINAL COMPOSITION and INFORMATION ON INGREDIENTS**

PRODUCT NAME	Ag	Cu	Zn	Ni	Sn	Other
SAFETY-SILV® 25	25	43	30		2	
SAFETY-SILV® 30	30	38	32			
SAFETY-SILV® 35	35	32	33			
SAFETY-SILV® 38T	38	32	28		2	
SAFETY-SILV® 40	40	30.5	29.5			
SAFETY-SILV® 40 Ni2	40	30	28	2		
SAFETY-SILV® 40 Ni5	40	30	25	5		
SAFETY-SILV® 40T	40	30	28		2	
SAFETY-SILV® 45	45	30	25			
SAFETY-SILV® 45T	45	27	25		3	
SAFETY-SILV® 50	50	34	16			
SAFETY-SILV® 50N	50	20	28	2		
SAFETY-SILV® 54	54	40	5	1		
SAFETY-SILV® 56	56	22	17		5	
SAFETY-SILV® 58	57.5	32.5		7		3 Mn

SAFETY-SILV® 60	60	25	15			
SAFETY-SILV® 60T	60	30			10	
SAFETY-SILV® 72	72	28				
Ag Clad 40 Ni2	See Safety-Silv® 40 Ni2 Composition. A clad strip (alloy-copper-alloy) in a 1-2-1 ratio.					

## 2. NOMINAL COMPOSITION and INFORMATION ON INGREDIENTS (Continued)

These products consist of metal wire or rods, some with a thin coating of flux on them. The exact amount of coating on each rod may vary. It can be reasonably estimated that there is less than 1% of each of the flux constituents present on any given rod when compared to the mass of the rod itself. The composition values given for the flux coating are the composition of the flux when the rods are flux-coated.

CHEMICAL NAME	CAS #	EXPOSURE LIMITS IN AIR				
		ACGIH-TLV		OSHA-PEL		OTHER
		TLV mg/m <sup>3</sup>	STEL mg/m <sup>3</sup>	PEL mg/m <sup>3</sup>	STEL mg/m <sup>3</sup>	

### COMPONENT 1: METAL WIRE or RODS

Copper (exposure limits are for copper fume, dusts, and mists)	7440-50-8	0.2 (fume) 1 (dusts & mists)	NE	0.1 (fume) 1 (dusts & mists)	NE	100	NIOSH RELS: TWA 1 = (dust); 0.1 (fume) DFG MAKs: TWA = 0.1 (fume-Respirable fraction); 1 (dusts & mists-inhalable fraction) PEAK = 2 MAK, 30 min., average value Carcinogen: EPA-D (dusts & mists)
Lithium	7439-93-2	NE	NE	NE	NE	NE	NE
Manganese (exposure limits are for Manganese, elemental, inorganic compounds, and fume, as Manganese)	7439-96-5	0.2	NE	1 (Vacated 1989 PEL)	5 (ceiling) 3 (vacated 1989 PEL)	500	NIOSH RELS: TWA = 1 STEL = 3 DFG MAK: TWA = 0.5 (Inhalable Fraction) PEAK = 10•MAK 30 min., average value DFG MAK Pregnancy Risk Classification: C Carcinogen: EPA-D
Nickel, Elemental metal	7440-02-0	1.5, A5 (Inhalable Fraction) (Not Suspected as a Human Carcinogen)	NE	1	NE	10	NIOSH REL: TWA = 0.015 Carcinogen: IARC-2B, MAK-1, NIOSH-X, NTP-R, TLV-A5
Silver	7440-22-4	0.01	NE	0.01	NE	10	NIOSH REL TWA = 0.01 (dust) DFG MAKs: TWA = 0.01 (Inhalable Fraction) PEAK = 2•MAK, 5 min., momentary value (Inhalable Fraction) Carcinogen: EPA-D
Tin	7440-31-5	2	NE	2	NE	100	NIOSH REL: TWA = 2

NE = Not Established. See Section 16 for Definitions of Terms Used.

NOTE (1): The ACGIH has an established exposure limit for Welding Fumes, Not Otherwise Classified. The Threshold Limit Value is 5 mg/m<sup>3</sup>. NIOSH classifies welding fumes as carcinogens. Single values shown are maximum, unless otherwise noted.

NOTE (2): ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-1998 format. This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

## 2. NOMINAL COMPOSITION and INFORMATION ON INGREDIENTS (Continued)

CHEMICAL NAME	CAS #	EXPOSURE LIMITS IN AIR					
		ACGIH-TLV		OSHA-PEL		IDLH mg/m <sup>3</sup>	OTHER mg/m <sup>3</sup>
		TLV mg/m <sup>3</sup>	STEL mg/m <sup>3</sup>	PEL mg/m <sup>3</sup>	STEL mg/m <sup>3</sup>		

### COMPONENT 1 (continued): METAL WIRE or RODS

Zinc (exposure limits are for zinc oxide, fume)	7440-66-6	5 (fume) 10 (dust)	10 (fume)	5 (fume) 5 (total dust) 15 (dust, respirable dust) 5 (dust, respirable dust, Vacated 1989 PEL)	10 (fume, Vacated 1989 PEL)	NE	NIOSH RELs: TWA = 5 (dust & fume) STEL = 10 (fume), 15 (ceiling, 15 min., dust) DFG MAK: TWA = 1.5 (Respirable Fraction) Carcinogen: EPA-D
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### COMPONENT 2: FLUX COATING ON RODS

CHEMICAL NAME	CAS #	% w/w	EXPOSURE LIMITS IN AIR					
			ACGIH-TLV		OSHA-PEL		IDLH mg/m <sup>3</sup>	OTHER mg/m <sup>3</sup>
			TLV mg/m <sup>3</sup>	STEL mg/m <sup>3</sup>	PEL mg/m <sup>3</sup>	STEL mg/m <sup>3</sup>		
Boric Acid	10043-35-3	10-35	NE	NE	NE	NE	NE	NE
Proprietary Fluoride Compound (exposure limits are for inorganic, solid Fluoride compounds, as F; 7789-75-5)	Proprietary	30-50	2.5, A4 (Not Classifiable as a human carcinogen)	NE	2.5	NE	NE	DFG MAKs: TWA = 2.5 (Inhalable Fraction) PEAK = 5•MAK 30 min., average value Carcinogen: IARC-3, TLV-A4
Methacrylate/Aliphatic & Naphthenic Hydrocarbon Compound	Proprietary		NE	NE	NE	NE	NE	NE
Water	7732-18-5	Balance	NE	NE	NE	NE	NE	NE

NE = Not Established. C = Ceiling Limit. See Section 16 for Definitions of Terms Used.

NOTE (1): The ACGIH has an established exposure limit for Brazing Fumes, Not Otherwise Classified. The Threshold Limit Value is 5 mg/m<sup>3</sup>. NIOSH classifies brazing fumes as carcinogens.

NOTE (2): All WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-1993 format.

## 3. HAZARD IDENTIFICATION

**EMERGENCY OVERVIEW:** These products are odorless, solid rods that have a metallic luster which may have a flux coating. These products are neither flammable nor reactive. If involved in a fire, these products may generate irritating fumes and a variety of metal oxides. Emergency responders must wear personal protective equipment suitable for the situation to which they are responding.

### GHS classification of the substance/mixture.

Classified according to the Globally Harmonised System of Classification and labelling of Chemicals (GHS) including Work, Health and Safety regulations, Australia.

**SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE:** During brazing operations, the most significant route of over-exposure is via inhalation of fumes.

**INHALATION:** Inhalation is not anticipated to be a significant route of over-exposure to the rod form of this product. Inhalation of large amounts of particulates generated by the rods during metal processing operations may be physically irritating and cause deposits of dust in nasal passages. Inhalation of dusts of Silver (a constituent of these products) can cause discoloration of eyes, nasal septum, throat, and skin. Inhalation of dusts and fumes of Copper, Manganese, and Zinc (constituents of these products) can cause metal fume fever. Symptoms can include a metallic or sweet taste in the mouth, sweating, shivering, headache, throat irritation, fever, chills, thirstiness, muscle aches, nausea, vomiting, weakness, fatigue, and shortness of breath. If dusts or particulates generated by the flux coating on the flux coated products are inhaled, they will irritate the nose, throat, and lungs. Dusts and particulates of the flux coating on the flux coated products may destroy mucous membranes and may cause pneumonitis.

### 3. HAZARD IDENTIFICATION (Continued)

**CONTACT WITH SKIN or EYES:** Contact of the rod form of these products with the skin is not anticipated to be irritating. Contact with the rod form of these products can be physically damaging to the eye (i.e., foreign object). Fumes generated during brazing operations may be irritating to the skin and eyes. Symptoms of skin over-exposure may include irritation and redness; prolonged or repeated skin over-exposures may lead to dermatitis. Contact with the molten core rods will burn contaminated skin or eyes. Eye contact with dusts or particulates generated by the flux coating on the flux coated products will cause irritation, pain, tearing, and reddening. Brief contact may cause eye damage and prolonged contact may cause permanent damage. Depending on the duration of over-exposure, skin contact with dusts or particulates generated by the flux coating on the flux coated products may cause irritation and burns. Chronic over-exposure to dusts or particulates generated by the flux coating on the flux coated products may cause borism (dry skin, eruptions, and gastrointestinal disturbances) or pustular dermatitis (visible collections of pus).



**SKIN ABSORPTION:** In some situations, one of the decomposition products of the flux coating may be hydrogen fluoride. Hydrogen fluoride can penetrate the skin and produce burns that may not be immediately painful or visible; the burns impact the lower layers of skin and bone tissue. Hydrogen fluoride exposures involving 20 percent of the body or more can be fatal through systemic fluoride poisoning.

**INGESTION:** Ingestion of rods is not a likely route of exposure.

**INJECTION:** Though not a likely route of occupational exposure for any of these products, injection (via punctures or lacerations in the skin) may cause local reddening, tissue swelling, and discomfort in addition to the wound.

**HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in Lay Terms.** Symptoms associated with over-exposure to these products and the fumes generated during brazing operations are as follows:

**ACUTE:** The chief acute health hazard associated with these products would be the potential for irritation of contaminated skin and eyes when exposed to fumes during brazing operations. Inhalation of large amounts of particulates generated by these products during metal processing operations may be physically irritating and cause deposits of dust in nasal passages. Inhalation of dusts and fumes of Copper, Manganese, and Zinc (constituents of these products) can cause metal fume fever. Symptoms can include a metallic or sweet taste in the mouth, sweating, shivering, headache, throat irritation, fever, chills, thirstiness, muscle aches, nausea, vomiting, weakness, fatigue, and shortness of breath. Contact with the molten material will burn contaminated skin or eyes. If particulates or fumes, generated during brazing operations, are ingested (i.e., through poor hygiene practices), nausea, vomiting, diarrhea, stomach ache, degeneration of blood and liver cells, gastro-intestinal bleeding, decreased urine output, listlessness, rapid heartbeat, convulsions, and coma may occur. Severe ingestion over-exposure may be fatal. Depending on the duration of over-exposure, dusts or particulates generated by the flux coating on the flux coated products may be irritating or damaging to the entire respiratory tract, eyes, and skin. In some situations, one of the flux coating's decomposition products may be hydrogen fluoride. Hydrogen fluoride can penetrate the skin and produce burns that may not be immediately painful or visible; the burns impact the lower layers of skin and bone tissue. If dusts or particulates generated by the flux coating on the flux coated products are swallowed, they may burn the mouth, throat, esophagus, and other tissues of the digestive system.

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM			
HEALTH		(BLUE)	0
FLAMMABILITY		(RED)	0
REACTIVITY		(YELLOW)	0
PROTECTIVE EQUIPMENT			X
EYES	RESPIRATORY	HANDS	BODY
	See Section 8		See Section 8
For routine industrial applications for the rods			

**See Section 16 for Definition of Ratings**

### 3. HAZARD IDENTIFICATION (Continued)

**CHRONIC:** Chronic skin over-exposure to the fumes of these products during brazing operations may produce dermatitis (red, inflamed skin). Chronic skin over-exposure to dusts or particulates generated by the flux coating on the flux coated products may cause borism (dry skin, eruptions, and gastrointestinal disturbances) or pustular dermatitis (visible collections of pus). Chronic ingestion of the fluoride component of the flux coating may cause osseous fluorosis (increased radiographic density of the bones). Symptoms of chronic ingestion of dusts or particulates generated by the flux coating on the flux coated products may include kidney damage, asthma, and pain in the joints and muscles.

**TARGET ORGANS:** For fumes: Skin, eyes, respiratory system.

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## PART II *What should I do if a hazardous situation occurs?*

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### 4. FIRST-AID MEASURES

Victims of chemical exposure must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take a copy of label and MSDS to health professional with victim.

**SKIN EXPOSURE:** If dusts or particulates generated by the flux coating on the flux coated products or fumes generated by brazing operations involving these products contaminate the skin, begin decontamination with running water. If molten material contaminates the skin, immediately begin decontamination with cold, running water. Minimum flushing is for 15 minutes. Victim must seek medical attention if any adverse reaction occurs.

**EYE EXPOSURE:** If dusts or particulates generated by the flux coating on the flux coated products or fumes generated by brazing operations involving these products enter the eyes, open victim's eyes while under gently running water. Use sufficient force to open eyelids. Have victim "roll" eyes. Minimum flushing is for 15 minutes. Victim must seek immediate medical attention.

**INHALATION:** If dusts or particulates generated by the flux coating on the flux coated products or fumes generated by brazing operations involving these products are inhaled, remove victim to fresh air. If necessary, use artificial respiration to support vital functions.

**INGESTION:** If swallowed call physician immediately! Do not induce vomiting unless directed by medical personnel. Rinse mouth with water if person is conscious. Never give fluids or induce vomiting if person is unconscious, having convulsions, or not breathing.

**MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:** Skin, respiratory, and kidney disorders may be aggravated by prolonged over-exposures to the dusts or fumes generated by these products.

**RECOMMENDATIONS TO PHYSICIANS:** Treat symptoms and eliminate overexposure.

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### 5. FIRE-FIGHTING MEASURES

**FLASH POINT:** Not flammable.

**AUTOIGNITION TEMPERATURE:** Not flammable.

**FLAMMABLE LIMITS (in air by volume, %):**

Lower (LEL): Not applicable.

Upper (UEL): Not applicable.

**FIRE EXTINGUISHING MATERIALS:**

Water Spray: YES

Halon: YES

Dry Chemical: YES

Carbon Dioxide: YES

Foam: YES

Other: Any "ABC" Class

**UNUSUAL FIRE AND EXPLOSION HAZARDS:** When involved in a fire, these products may generate irritating fumes and a variety of metal oxides. If involved in a fire, the flux coating on the flux coated products may decompose to release fluoride compounds, boric anhydride, and hydrogen fluoride. The molten rods can present significant thermal hazards to firefighters.

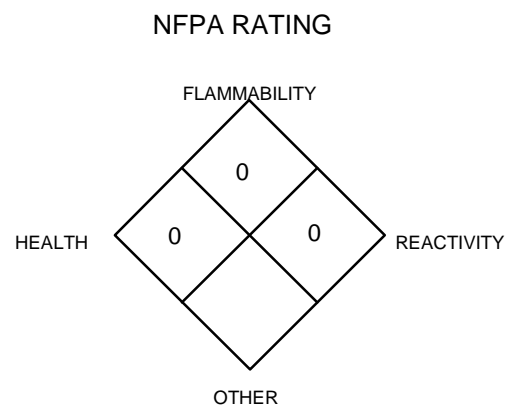
Explosion Sensitivity to Mechanical Impact: Not sensitive.

Explosion Sensitivity to Static Discharge: Not sensitive.

**SPECIAL FIRE-FIGHTING PROCEDURES:** Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Chemical resistant clothing may be necessary. If possible, prevent run-off water from entering storm drains, bodies of water, or other environmentally sensitive areas.

#### Additional information

Read and understand the Work Safe Australia Code of Practice on Welding Processes and "Standard for Fire Prevention During Welding, Cutting and Other Hot Work" before using this product. Section 274 of the Work Health and Safety Act (the WHS Act.)



**See Section 16 for  
Definition of Ratings**

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## 6. ACCIDENTAL RELEASE MEASURES

**SPILL AND LEAK RESPONSE:** Not applicable.

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### **PART III** *How can I prevent hazardous situations from occurring*

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## 7. HANDLING and STORAGE

**WORK PRACTICES AND HYGIENE PRACTICES:** As with all chemicals, avoid getting these products ON YOU or IN YOU. Wash hands after handling these products. Do not eat or drink while handling these products. Use ventilation and other engineering controls to minimize potential exposure to these products.

**STORAGE AND HANDLING PRACTICES:** All employees who handle these products should be trained to handle them safely. Use in a properly ventilated location. Avoid breathing fumes of these products during brazing operations. Open containers on a stable surface. Packages of these products must be properly labeled.

When these products are used during brazing operations, follow the requirements of the Federal Occupational Safety and Health Welding and Cutting Standard (29 CFR 1910 Subpart Q) and the safety standards of the American National Standards Institute for welding and cutting (ANSI Z49.1).

Store packages in a cool, dry location. Storage in an atmosphere that is wet, moist, or highly humid may lead to corrosion of these products. Store away from incompatible materials (see Section 10, Stability and Reactivity).

**PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT:** Not applicable.

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## 8. EXPOSURE CONTROLS - PERSONAL PROTECTION

**VENTILATION AND ENGINEERING CONTROLS:** Use with adequate ventilation to ensure exposure levels are maintained below the limits provided in Section 2 (Composition and Information on Ingredients). Prudent practice is to ensure eyewash/safety shower stations are available near areas where these products are used.

**RESPIRATORY PROTECTION:** Maintain airborne contaminant concentrations below guidelines listed in Section 2 (Composition and Information on Ingredients). If respiratory protection is needed (i.e. a Weld Fume Respirator, or Air-Line Respirator for welding in confined spaces), use only protection authorized in 29 CFR 1910.134 or applicable State regulations. Respiratory Protection is recommended to be worn during welding operations. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full-facepiece pressure/demand SCBA or a full facepiece, supplied air respirator with auxiliary self-contained air supply is required under OSHA's Respiratory Protection Standard (1910.134-1998). Respiratory protection guidelines for Copper and Silver dusts (as may be generated during metal processing) and Zinc Oxide (as may be generated during brazing) are provided as follows:

Read and understand the manufacturer's instruction and the precautionary label on the product. Refer to Lincoln Safety Publications at [www.lincolnelectric.com/safety](http://www.lincolnelectric.com/safety). See the Australian Standard - AS 1674.1 – 1997 – Reconfirmed 2016. Safety in Welding and Allied Processes Australia.

### **COPPER**

#### **CONCENTRATION      RESPIRATORY PROTECTION**

Up to 5 mg/m<sup>3</sup>: Dust and mist respirator.

Up to 10 mg/m<sup>3</sup>: Dust and mist respirator except single-use and quarter-mask respirator (if not present as a fume); or Supplied Air Respirator (SAR).

Up to 25 mg/m<sup>3</sup>: Powered air-purifying respirator with dust and mist filter(s); or SAR operated in a continuous-flow mode.

Up to 50 mg/m<sup>3</sup>: Full-facepiece respirator with high-efficiency particulate filter(s); or full-facepiece Self-Contained Breathing Apparatus (SCBA); or full-facepiece SAR; or powered air-purifying respirator with tight-fitting facepiece and high-efficiency particulate filter.

Up to 100 mg/m<sup>3</sup>: Positive pressure, full-facepiece SAR. (continued on next page)

Emergency or Planned Entry into Unknown Concentrations or IDLH Conditions: Positive pressure, full-facepiece SCBA; or positive pressure, full-facepiece SAR with an auxiliary positive pressure SCBA.

Escape: Full-facepiece respirator with high-efficiency particulate filter(s); or escape-type SCBA.

## 8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

### RESPIRATORY PROTECTION (continued):

#### SILVER (METAL DUST AND SOLUBLE COMPOUNDS, AS SILVER)

##### CONCENTRATION

##### RESPIRATORY PROTECTION

Up to 0.25 mg/m<sup>3</sup>: Supplied Air Respirator (SAR) operated in a continuous-flow mode or powered air-purifying respirator with high-efficiency particulate filter.

Up to 0.5 mg/m<sup>3</sup>: Full-facepiece respirator with high-efficiency particulate filter(s), full-facepiece Self-Contained Breathing Apparatus (SCBA), or full-facepiece SAR.

Up to 10 mg/m<sup>3</sup>: Positive pressure, full-facepiece SAR.

Emergency or Planned Entry into Unknown Concentrations or IDLH Conditions: Positive pressure, full-facepiece SCBA or positive pressure, full-facepiece SAR with an auxiliary positive pressure SCBA.

Escape: Full-facepiece respirator with high-efficiency particulate filter(s) or escape-type SCBA.

#### ZINC OXIDE

##### CONCENTRATION

##### RESPIRATORY PROTECTION

Up to 50 mg/m<sup>3</sup>: Dust, mist, and fume respirator or SAR.

Up to 125 mg/m<sup>3</sup>: Powered air-purifying respirators with dust, mist, and fume filter(s) or SAR operated in a continuous flow mode.

Up to 250 mg/m<sup>3</sup>: Full-facepiece air-purifying respirator with high-efficiency particulate filter(s), powered air-purifying respirator with tight-fitting facepiece and high-efficiency particulate filter(s), SAR with a tight-fitting facepiece operated in a continuous flow mode, full-facepiece SCBA, or full-facepiece SAR.

Up to 500 mg/m<sup>3</sup>: Positive pressure SAR.

Emergency or Planned Entry into Unknown Concentrations or IDLH Conditions: Positive pressure, full-facepiece SCBA or positive pressure, full-facepiece SAR with an auxiliary positive pressure SCBA.

Escape: Full-facepiece air-purifying respirator with high-efficiency particulate filter(s) or escape-type SCBA.

**EYE PROTECTION:** Safety glasses. When these products are used in conjunction with brazing, wear safety glasses, goggles, or face-shield with filter lens of appropriate shade number (per ANSI Z49.1-1988, "Safety in Welding and Cutting").

**HAND PROTECTION:** Wear gloves for routine industrial use. When these products are used in conjunction with brazing, wear gloves that protect from sparks and flame (per ANSI Z49.1-1988, "Safety in Welding and Cutting").

**BODY PROTECTION:** Wear body protection appropriate for task.

**Refer to the Safe Environments risk management document – Welding Fume -** <http://www.safeenvironments.com.au/welding-fume/> The exposure standard refers to the publication by Work Safe Australia "Workplace Exposure Standard for Airborne Contaminants" with the Date of Effect being 22 December 2011. Work Safe Australia note that "exposure standards do not represent a fine dividing line between a healthy and unhealthy work environment. Natural biological variation and the range of individual susceptibilities mean that a small number of people might experience adverse health effects below the exposure standard."

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## 9. PHYSICAL and CHEMICAL PROPERTIES

The following information is for elemental copper:

**RELATIVE VAPOR DENSITY (air = 1):** Not applicable.

**SPECIFIC GRAVITY @ 20°C (water = 1):** 8.94

**SOLUBILITY IN WATER:** Insoluble.

**VAPOR PRESSURE:** Approximately zero.

**ODOR THRESHOLD:** Not applicable.

**COEFFICIENT OF OIL/WATER DISTRIBUTION (PARTITION COEFFICIENT):** Not applicable.

**EVAPORATION RATE (nBuAc = 1):** Not applicable.

**FREEZING/MELTING POINT:** 1083°C (1981°F)

**pH:** Not applicable.

**BOILING POINT:** 2595°C (4703°F)

The following information is for elemental silver:

**RELATIVE VAPOR DENSITY (air = 1):** Not applicable.

**SPECIFIC GRAVITY @ 20°C (water = 1):** 10.49

**SOLUBILITY IN WATER:** Insoluble.

**VAPOR PRESSURE, mm Hg @ 1284°C:** Approximately zero.

**ODOR THRESHOLD:** Not applicable.

**COEFFICIENT OF OIL/WATER DISTRIBUTION (PARTITION COEFFICIENT):** Not applicable.

**EVAPORATION RATE (nBuAc = 1):** Not applicable.

**FREEZING/MELTING POINT:** 960.5°C (1760.9°F)

**pH:** Not applicable.

**BOILING POINT @ 24 mm Hg:** Approx. 2212°C (4014°F)

The following information is for elemental zinc:

**RELATIVE VAPOR DENSITY (air = 1):** Not applicable.

**SPECIFIC GRAVITY @ 20°C (water = 1):** 7.14

**SOLUBILITY IN WATER:** Insoluble.

**VAPOR PRESSURE, mm Hg @ 487°C:** 1

**ODOR THRESHOLD:** Not applicable.

**COEFFICIENT OF OIL/WATER DISTRIBUTION (PARTITION COEFFICIENT):** Not applicable.

**EVAPORATION RATE (nBuAc = 1):** Not applicable.

**FREEZING/MELTING POINT:** 419°C (786°F)

**pH:** Not applicable.

**BOILING POINT:** 907°C (1665°F)

## 9. PHYSICAL and CHEMICAL PROPERTIES (Continued)

The following information is for the products:

**APPEARANCE, ODOR AND COLOR:** These products are odorless, solid rods that have a metallic luster, which may have a flux coating.

**HOW TO DETECT THIS SUBSTANCE (warning properties):** The appearance is a distinctive characteristic of these products.

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## 10. STABILITY and REACTIVITY

**STABILITY:** Stable.

**DECOMPOSITION PRODUCTS:**

BARE RODS: Metal oxides.

COATED RODS: Metal oxides, boric anhydride, fluoride compounds, and hydrogen fluoride.

**MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE:** Strong acids, strong oxidizers, acetylene, halogenated hydrocarbons, halogens, ammonium nitrate, sulfur, potassium, alkali carbonates, alkali hydroxides, glass, other silica-based compounds.

**HAZARDOUS POLYMERIZATION:** Will not occur.

**CONDITIONS TO AVOID:** Avoid uncontrolled exposure to extreme temperatures, incompatible materials.

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## PART IV *Is there any other useful information about this material?*

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## 11. TOXICOLOGICAL INFORMATION

**TOXICITY DATA:** Presented below are human toxicological data available for the constituents of these products present in concentration greater than 1%. Other data for animals are available for the constituents of these products, but are not presented in this Material Safety Data Sheet.

**BORIC ACID:**

Skin Irritancy (human) = 15 mg/ 3 days/ intermittent; mild

LD (oral, human) = 37 mg/kg/ boron as boric acid

LD (skin, infant) = 210 mg/kg/ boron as boric acid

TDLo (oral, rat) = 45000 mg/kg/ 90 days/ male; reproductive effects

TDLo (oral, child) = 500 mg/kg; gastrointestinal effects

LDLo (oral, man) = 429 mg/kg; cardiovascular, systemic effects

LDLo (oral, woman) = 200 mg/kg

TDLo (oral, infant) = 800 mg/kg/ 4 weeks/ intermittent

**BORIC ACID (continued):**

LDLo (oral, infant) = 934 mg/kg

LDLo (skin, infant) = 1200 mg/kg

LDLo (skin, child) = 4000 mg/kg/ 4 days

LDLo (skin, man) = 2430 mg/kg

LDLo (skin, child) = 1500 mg/kg

LDLo (subcutaneous, infant) = 1100 mg/kg

TDLo (unreported, man) = 170 mg/kg; gastrointestinal effects

LDLo (unreported, man) = 147 mg/kg

**COPPER:**

TDLo (oral-human) = 0.12 mg/kg; gastrointestinal effects

**MANGANESE:**

TCLo (inhalation-man) = 2300  $\mu\text{g}/\text{m}^3$ ; BRN, central nervous system effects

**SILVER:**

TCLo (inhalation-human) = 1  $\text{mg}/\text{m}^3$ ; skin effects

**ZINC:**

Skin Irritancy (human) = 300 mg/ 3 days/ intermittent; mild

TCLo (inhalation-human) = 124  $\text{mg}/\text{m}^3$ / 50 minutes; pulmonary system effects, skin

**SUSPECTED CANCER AGENT:** Components of these products are listed as follows:

**COPPER:** EPA-D (Not Classifiable as to Human Carcinogenicity)

**MANGANESE:** EPA-D (Not Classifiable as to Human Carcinogenicity)

**PROPRIETARY FLUORIDE COMPOUND (as a Fluoride Compound):** IARC-3 (Unclassifiable as to Carcinogenicity in Humans), ACGIH TLV-A4 (Not Classifiable as a Human Carcinogen)

**NICKEL, ELEMENTAL, METAL:** IARC-2B (Possibly Carcinogenic to Humans), MAK-1 (Substances which Cause Cancer in Man), NIOSH-X, (Carcinogen Defined with no Further Categorization); NTP-R (Reasonably Anticipated to be a Human Carcinogen), ACGIH TLV-A5 (Not Suspected as a Human Carcinogen)

**SILVER:** EPA-D (Not Classifiable as to Human Carcinogenicity)

**ZINC:** EPA-D (Not Classifiable as to Human Carcinogenicity (inadequate human and animal evidence of carcinogenicity or no data available))

The other constituents of these products are not found on the following lists: FEDERAL OSHA Z LIST, NTP, IARC, and CAL/OSHA and therefore are not considered to be, nor suspected to be, cancer-causing agents by these agencies.

**IRRITANCY OF PRODUCT:** The dusts or fumes of these products may be irritating to contaminated skin, eyes, respiratory system, and other tissues.

**SENSITIZATION TO THE PRODUCT:** Rare cases of allergic contact dermatitis have been reported in people working with copper dust. Nickel has been reported to cause sensitization effects in sensitive individuals.



## 11. TOXICOLOGICAL INFORMATION (Continued)

**REPRODUCTIVE TOXICITY INFORMATION:** Listed below is information concerning the effects of these products and their constituents on the human reproductive system.

**Mutagenicity:** These components are not reported to produce mutagenic effects in humans. Animal mutation data are available for Boric Acid and Nickel (constituents of these products); these data were obtained during clinical studies on specific animal tissues exposed to high doses of this compound.

**Embryotoxicity:** These components are not reported to produce embryotoxic effects in humans.

**Teratogenicity:** These components are not reported to cause teratogenic effects in humans. Clinical studies on test animals exposed to relatively high doses of Copper and Nickel (constituents of these products) indicate teratogenic effects.

**Reproductive Toxicity:** These components are not reported to cause reproductive effects in humans. Clinical studies on test animals exposed to relatively high doses of Boric Acid and Copper (constituents of these products) indicate adverse reproductive effects.

A *mutagen* is a chemical, which causes permanent changes to genetic material (DNA) such that the changes will propagate through generational lines. An *embryotoxin* is a chemical, which causes damage to a developing embryo (i.e., within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A *teratogen* is a chemical, which causes damage to a developing fetus, but the damage does not propagate across generational lines. A *reproductive toxin* is any substance, which interferes in any way with the reproductive process.

**BIOLOGICAL EXPOSURE INDICES:** Currently, there are Biological Exposure Indices (BEIs) determined for the Fluoride Compound component of the Flux Coating (as a Fluoride).

BIOLOGICAL EXPOSURE INDICES (BEIs) for components of these products are as follows:		
CHEMICAL: DETERMINANT	SAMPLING TIME	BEI
FLUORIDES: Fluorides in urine	Prior to shift End of shift	3 mg/g creatinine 10 mg/g creatinine

## 12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

**ENVIRONMENTAL STABILITY:** The metal components of these products occur naturally in the environment and are expected to persist in the environment for an extended period of time. Components of these products will react with water and air to form a variety of stable metal oxides and inorganic compounds. Additional environmental data are available as follows:

**BORIC ACID:** Water solubility = 1 g/ 18 mL (cold), 1 g/ 4 mL (boiling).

**COPPER:** Solubility: Insoluble. There is no evidence of any biotransformation for copper compounds. Copper is accumulated by all plants and animals. BCF Algae = 12; plants = 1,000; invertebrate = 1,000, fish = 667 and fish =200 (Soluble copper salts).

**NICKEL:** Water solubility: Insoluble. Nickel is stable in air at ordinary temperature and is not affected by water. No data were found to suggest that nickel is involved in any biological transformation in the aquatic environment.

**SILVER:** Solubility: Insoluble in water. Many silver salts are only slightly soluble and so silver cations will rapidly be reduced to lower levels. The Biological Half-Life for silver is a few days for animals and up to 50 days for humans.

**ZINC:** Solubility: Insoluble in water. Biological Half-Life for normal humans 162-500 days. Bioconcentration: The Bioconcentration Factor in edible portions of *Crassostrea virginica*, adult oyster) is 16,700 (total zinc).

**EFFECT OF MATERIAL ON PLANTS or ANIMALS:** The components of these products occur naturally in the environment and are essential for plant and animal life. This product is not expected to cause adverse effects on plant or animal life. Specific data on test animals are available but are not presented in this Material Safety Data Sheet.

**EFFECT OF CHEMICAL ON AQUATIC LIFE:** These products are not expected to cause adverse effects on aquatic life. Additional aquatic toxicity data are available as follows:

**BORIC ACID:**

LC<sub>50</sub> (trout eggs) = 100 ppm/ soft  
 LC<sub>50</sub> (trout eggs) = 79 ppm/ hard  
 LC<sub>50</sub> (catfish eggs) = 155 ppm/ soft  
 LC<sub>50</sub> (catfish eggs) = 22 ppm/ hard  
 LC<sub>50</sub> (goldfish eggs) = 46 ppm/ soft  
 LC<sub>50</sub> (goldfish eggs) = 75 ppm/ hard  
 LC<sub>50</sub> (*Daphnia magna*) = 133 mg/L/ 48 hours

**COPPER:** Copper is concentrated by plankton by 1000 or more. Copper may concentrate to toxic level in the food chain

**SILVER:** 0.1 ppm is toxic to bacteria and aquatic life. Discharge into marine waters should not exceed 1/20 of 96 hour LC<sub>50</sub>, 0.25–0.025 mg/kg/day.

**ZINC:** Odorless zinc poisoning causes inflamed gills in fish. Laboratory studies of Atlantic salmon, rainbow trout, carp, and goldfish have shown avoidance reactions by these fish to zinc in water.

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### 13. DISPOSAL CONSIDERATIONS

**PREPARING WASTES FOR DISPOSAL:** Waste disposal must be in accordance with appropriate, State, and local regulations. These products, if unaltered by use, may be disposed of by treatment at a permitted facility or as advised by your local hazardous waste regulatory authority.

**EPA WASTE NUMBER:** Wastes of these products should be tested per the Toxicity Characteristic Leaching Procedures requirements of RCRA to determine if such wastes meet the following characteristic: D011 (Silver) 5.0 mg/L (Regulated Level).

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### 14. TRANSPORTATION INFORMATION

**THIS MATERIAL IS NOT HAZARDOUS (Per 49 CFR 172.101) BY THE U.S. DEPARTMENT OF TRANSPORTATION.**

**PROPER SHIPPING NAME:** Not applicable.  
**HAZARD CLASS NUMBER and DESCRIPTION:** Not applicable.  
**UN IDENTIFICATION NUMBER:** Not applicable.  
**PACKING GROUP:** Not applicable.  
**DOT LABEL(S) REQUIRED:** Not applicable.  
**NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER, 2000:** Not applicable.  
**MARINE POLLUTANT:** No component of this product is designated as a marine pollutant

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### 15. REGULATORY INFORMATION

**Product Name:** High Silver Brazing Alloys

Refer to the Australian Inventory of Chemical Substances – AICS at <https://www.nicnas.gov.au/chemicals-on-AICS#main>

**Poison schedule:** Classified as a Schedule 6 (S6) Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP). <https://www.legislation.gov.au/Details/F2016L01638>

**Classifications:** Safework Australia criteria is based on the Globally Harmonised System (GHS) of Classification and Labelling of Chemicals.

The classifications and phrases listed below are based on the Approved Criteria for Classifying Hazardous Substances [NOHSC: 1008(2004)].

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### 16 Other information

#### References

Preparation of Safety Data Sheets for Hazardous Chemicals Code of Practice

Standard for the Uniform Scheduling of Medicines and Poisons

Australian Code for the Transport of Dangerous Goods by Road & Rail.

Modell Work Health and Safety Regulations, Schedule 10: Prohibited carcinogens, restricted carcinogens and restricted hazardous chemicals.

Workplace exposure standards for airborne contaminants, Safe work, Australia

American Conference of Industrial Hygienists (ACGIH)

Globally Harmonised System of classification and labelling of chemicals.

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**WELDING (1):** Due to the diversity of welding techniques, processes, materials used, nature of the surface being welded and the presence of contaminants, the fumes & gases associated with welding will vary in composition and quantity. When assessing a welding process, the toxic fumes generated may not only be associated with the parent metal, filler wire or electrode. The welding/cutting arc may generate nitrogen oxides, carbon monoxide & other gases, whilst UV radiation emitted from some arcs generates ozone. Ozone may irritate mucous membranes and cause pulmonary oedema & haemorrhage. Shielding gases (e.g. carbon dioxide and inert gases i.e. argon and helium) in high concentrations, in confined spaces, may reduce oxygen in the atmosphere to dangerous levels, resulting in possible asphyxiation.

**WELDING (2):** In addition to complying with individual exposure standards for specific contaminants, where current manual welding processes are used, the fume concentration inside the welder's helmet should not exceed 5 mg/m<sup>3</sup> ( unless otherwise classified) when collected in accordance with Australian Standard AS 3853.1: Fume from welding and allied processes - Guide to methods for the sampling and analysis of particulate matter and AS 3853.2: Fume from welding and allied processes - Guide to methods for the sampling and analysis of gases. Airway irritation and metal fume fever are the most common acute effects from welding fumes. Reported to cause reduced sperm quality in welders.

**WELDING (3):** Other gases and fumes associated with welding processes include: Inert shielding gases (e.g. argon, carbon dioxide, helium) which may reduce the atmospheric oxygen content in poorly ventilated areas. UV-radiation and Infra-Red radiation may decompose chlorinated degreasing agents to form highly toxic and irritating phosgene gas. This may occur if a metal has been degreased but inadequately dried or when vapours from a nearby degreasing bath enter the welding zone.

**WELDING (4):** Welding fumes may contain a wide variety of chemical contaminants, including oxides and salts of metals and other compounds which may be generated from electrodes, filler wire, flux materials and from the welded material (e.g. painted surfaces). Welding stainless-steel and its alloys generates nickel and chromium (VI) compounds. Welding fumes are retained in the lungs. Sparingly soluble compounds may be released slowly from the lungs. Welding fume is classified as possibly carcinogenic to humans (IARC Group 2B).

#### **PERSONAL PROTECTIVE EQUIPMENT GUIDELINES:**

The recommendation for protective equipment contained within this report is provided as a guide only. Factors such as method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made.

#### **Disclaimer:**

We urge each end user and recipient of this SDS to study it carefully. If necessary, consult an industrial hygienist or other expert to understand this information and safeguard the environment and protect workers from potential hazards associated with the handling or use of this product.

Harris Products Group cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for use, handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.

[ End of SDS ]

